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ABSTRACT

Students in four university classes in educational psychology were used as the target population to study the effect of two factors, degree of effort exerted studying a subject, and written feedback from the instructor, on the cognitive and affective attitudes these students formed toward the subject and their assignments. The students, unaware that they were subjects in an experiment, received high or low effort assignments and high or no praise comments. Two assignments were given to each student from two different materials to assure counterbalancing of teacher, classroom selection, and time of day effects. The effort by praise (2x2) multivariate analysis of covariance and class by praise (4x2) ANOVAs showed that students who received high praise and completed the high effort assignments formed significantly more positive attitudes than students in the other three groups. (Author/MC)

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The Effect of Effort and Feedback on the Formation of Student Attitudes*

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The Effect of Effort and Feedback on the Formation of Student Attitudes

Abstract

The effect of two factors, (1) degree of effort exerted studying a subject, and (2) written feedback from the instructor, on the cognitive and affective attitudes students formed toward the subject and assignment was determined in four university classes. The students, unaware that they were subjects in an experiment, received high or low effort assignments and high or no praise comments. Two assignments were given to each student from two different materials to assure counterbalancing of teacher, classroom selection, and time of day effects. The effort by praise (2 x 2) multivariate analysis of covariance and class by praise (4 x 2) ANOVAs showed that students who received high praise and completed the high effort assignments formed significantly more positive attitudes than students in the other three groups.

During my graduate course work a few years ago I was introduced to a concept called cognitive dissonance. I was much intrigued by the notion but had a great amount of difficulty applying the idea to school learning. Upon further study it became obvious that the more broad question of attitude formation was one which has not been researched very much in education. (Bloom, Hastings, & Madus, 1971; Kahn & Weiss, 1973; Ringness, 1975). The dissonance literature was relevant in specifying how the feedback we receive after completing a task and the attributions we make related to causation can be an important factor in attitude development. The difficulty was formulating a reasonable research effort in schools to test some of the dissonance theory. It was also difficult to specify an "attitude" which could be measured. Many writers have stressed the importance of developing positive attitudes of students toward the subject matter they study (Bloom, Hastings, & Madus, 1971; Kahn & Weiss, 1973; Ringness, 1975). Phil Jackson (1968) has pointed out that there is little relationship between pupil attitudes toward school and scholastic success, and a positive relationship between pupil attitude toward a specific subject and achievement in that subject has been confirmed through a large number of studies.[2] Thus, I decided to investigate dissonance theory in the context of pupil attitudes toward school subjects.

Despite evidence demonstrating the significance of positive attitudes toward school subjects, little research has been conducted concerning the development of these attitudes (Aiken, 1970; Bloom, Hastings, & Madus, 1971; Kahn & Weiss, 1973; Watson, 1963). That is, how do these attitudes develop and what factors or variables are related to the formation of the attitudes? The purpose of the present study is to determine the effect of two factors on the attitudes students form toward the

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2 A list of 17 studies which show significant relationships is indicated in McMillan (1976).

subject matter of an assignment and the task related to acquiring knowledge of the subject. The two factors are (1) the degree of effort students exert studying the subject, and (2) high praise or no praise feedback the student receives from the instructor on the assignment.

Research on the effect of these two variables on attitude development is inconclusive. There is some research which suggests that students will form positive attitudes if they are rewarded for displaying the attitude or rewarded for achievement in a subject (Bostrom, Vlandis, & Rosenbaum, 1961; Mager, 1968; Neidt, & Hedlund; Teigland, 1966). Yet, some evidence exists to suggest that rewarding students is not helpful, and may in fact promote unfavorable attitudes (Deci, 1971; Greene, & Lepper, 1974; Kruglanski, Along, & Lewis, 1972; Kruglanski, Friedman, & Zeevi, 1971; Ryan, 1968; Schock, 1973). The nature of the reinforcement, as extrinsic or intrinsic, and effort exerted in the related task may partially explain the contradictory findings. An extrinsic reward such as money or a prize may have little or negative effect while an intrinsic reward such as praise is likely to have a positive effect. According to Festinger (1961) and Bem (1967), if a person exerts a high amount of effort to perform a task and is given an extrinsic reward, that person will value the task for the reward, not for itself. Conversely, if there is no reward, the person will resolve the dissonance which ensues by valuing the task. Buenz and Merrill (1968) and Kauchak (1973) provide evidence to support this theory in the formation of student attitudes. Thus, the degree of effort associated with the rewarded activity may effect the attitudes formed. In a related series of experiments, Maehr (1976) has studied the effect of internal or external evaluation on motivation and has, in general, supported the findings of Deci and others. He and William Stallings (1972) also found that task difficulty, as "easy" or "hard" interacted

with internal and external evaluation to effect continued interest in the task. They found students who received the "hard" task and internal evaluation were more likely to show continued interest. Aronson (1961) studied the effect of effort and extrinsic rewards, and found that students who exerted high effort and received little reward and students who exerted high effort and received a high reward showed the same attitude, while in a low effort condition students who received a high reward showed more positive attitudes than students who received little reward.

The present study replicates Aronson's experiment with several significant changes. Aronson's experiment was conducted in a laboratory setting, used extrinsic rewards, and a single dependent measure. The present study was conducted in actual classes and the students were unaware that they were subjects in an experiment. Rewards in the form of instructor written comments on assignments were used, and there were five dependent variables. No research could be found to suggest whether written comments were viewed as intrinsic or extrinsic rewards. However, it seemed possible that the comments could be viewed as an intrinsic reward for attitudes toward the subject matter studied, and at the same time viewed as an extrinsic "pass" or "fail" message with regard to the task of completing the assignment. The attitudes which develop toward the task, then, comprise one set of dependent variables and should correspond to the results Aronson attained. The attitudes toward the subject matter, however, should develop with the influence of an intrinsic reward, and the rewarded groups should show more positive attitudes than the non-rewarded groups. The attitudes toward the subject matter are the second set of dependent variables. It was unclear from the beginning how degree of effort would interact with intrinsic rewards.

Method

Variables:

The independent variables were the degree of effort exerted and feedback received on an assignment. Each condition was refined in two pilot studies and had two levels, high and low effort and high and no praise. The high effort condition consisted of an assignment in which students wrote a 3 to 4 page answer to a question regarding the material they had read. The low effort condition had approximately the same question but the students were asked to list the answers in one page. The high praise feedback consisted of written comments throughout the assignment the students handed in which indicated that the student had done excellent work, knew the material well, had done a very good job. The no praise feedback consisted of comments such as: poor work, didn't know the material well, less than average job.

The dependent variables were (a) attitudes toward the content of chapter 26 in Educational Psychology (Gage & Berliner, 1975) and The Process of Education (Bruner, 1963); (b) affective and cognitive attitudes[3] toward reading the book and chapter; (c) affective and cognitive attitudes toward writing the book and chapter assignments.

Instruments:

The pre-test instrument was a series of Likert-type statements which described the point of view of the book and chapter. The purpose of these items was

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3 Cognitive and affective are defined to represent the cognitive and affective components of the tripartite theory of attitude composition. The cognitive component corresponds to evaluate beliefs about the object, how valuable or worthwhile it is for the person. The affective component represents the feeling or emotional response, enjoying or disliking the object.

to measure reactions to a sampling of each material, thus it was most important that the items tap the ideas presented in each material. The pre-test also included items which measured attiutdes toward reading educationally related materials and teaching as a profession. The averages of the items for each of three areas were used as covariates in the statistical analyses.

The post-test instruments contained the same items to measure attitudes toward the content of the book and chapter, though ordered differently in the context of new statements. Other items measured the classroom climates (adopted from the Learning Environment Inventory (Walberg & Anderson, 1972); affective and cognitive attitudes toward reading the book and chapter and writing the answers to the assignments; degree of effort exerted in reading the materials and writing the assignments; meaningfulness of feedback received; and ratings of instructor knowledge of an attitude toward the materials.

Subjects:

Four sections of an undergraduate Educational Psychology course at Northwestern University fall term, 1975, were used to provide subjects. Each class had between 30 and 35 students representing sphomores, juniors and seniors, and a wide range of majors. Approximately half the students were female, half male, though the distribution of each sex varied in different classes.

Design:

A quasi-experimental non-equivalent group research design was used for the study (Campbell & Stanley, 1963; Rieken, et al., 1974). Two instructors each taught two classes, one in the morning and one in the afternoon. The assignment

of the effort condition was random by class, so that the two levels of the condition for the book and chapter were counterbalanced for teacher and time of day. Each instructor gave a high effort assignment to one class for the book and a low effort assignment for the book to his/her other class. The opposite assignments were given to each class for the chapter. Thus, one instructor gave a high effort assignment for the book in his a.m. class and a low effort assignment for the book in his p.m. class. The same instructor, at the same time, gave a low effort assignment for the chapter in his a.m. class and a high effort assignment for the chapter in his p.m. class. The second instructor gave the opposite assignments: low effort for the book and high effort for the chapter in his a.m. class and high effort for the book and low effort for the chapter in his p.m. class. The second independent variable, high praise or no praise feedback, was administered randomly by student in each of the effort conditions.

Procedures:

During the first class session of the term each student in the four classes was given the pre-test and two assignments (one for the book and one for the chapter). The assignments were handed in one week later, the third class session. Before the assignments were returned to the students the instructor randomly wrote comments of high or no praise on each paper. After the assignments were returned the fourth class session the post-tests were administered, and the students were completely debriefed about the experiment.

Data Analysis:

The dependent variables are examined in two analyses. The first is an effort by praise (2 x 2) multivariate analysis of covariance for each material. In this analysis the students are pooled from different classes in each cell,

and because of the counterbalancing in the research design, control the possible effects of different teachers (i.e., teacher enthusiasm or knowledge of the subject), time of day of classes, or selection characteristics in each class (i.e., classroom climate). The second analysis is a praise by class (2 x 4) analysis of variance of each dependent variable for the book and chapter. This analysis is computed to determine if each class is contributing equally to the praise by effort analysis. A multivariate analysis would not be appropriate since there are fewer dependent variables (5) than groups (8).

Results

Tables 1a - 2d report the means, standard deviations, and tests of significance for the praise by effort multivariate analysis of covariance for attitudes toward the content of the book and chapter, toward reading the materials and writing the assignments. The interaction of effort and feedback variables for the book is statistically significant (F (5,98) = 2.47, $p < .04$). The standardized discriminant function coefficients indicate that the cognitive attitude toward reading the book is the dependent variables accounting for this disordinal interaction, and an analysis of the cell means shows that the high effort, high praise group reported a more positive attitude

than did the other three groups. The same pattern of results if repeated for all the dependent variables except the attitude toward the content of the book, and is further confirmed by the statistically significant univariate F ratios (Graph 1). The F ratio for the main effect of praise is not significant, but the effect of effort is significant (F (3,98) = 2.48, $p < .04$). However, the interpretation of the effort effect must take into consideration the interaction results.

The results for the chapter show that the main effect of praise is significant (F (5,98) = 5.52, $p < .001$); neither the interaction nor effect of effort is significant. The standardized discriminant function coefficients in the praise analysis indicate that three variables, cognitive attitude toward reading the chapter and cognitive and affective attitudes toward writing the assignment are contributing most to the significant difference. The cell means for these variables show that the high praise groups formed a more positive attitude with these dependent variables than did the no praise students. The cell means also show that the high effort-high praise groups developed more positive attitudes than the other three groups, though this difference was not statistically significant.

The second set of analyses used a class by praise (4 x 2) design. The results of the five ANOVAs for the attitudes related to the book, one for each dependent variable, are reported in Tables 2a and 2b. The results of these tests indicate that the interaction of class by praise is significant for the variables: a) affective attitude toward reading the book (F (3,98) = 2.61, $p < .056$), b) cognitive attitude toward reading the book (F (3,98) = 3.28, $p < .024$), and c) affective attitude toward reading the book (F (3,98) = 2.55, $p < .06$). In all three cases the pattern of the interaction is the same. Students in classes one and

Table 1a

Means and Standard Deviations of Praise by Effort Multivariate Analysis of Covariance on Attitudes Toward The Process of Education Post-Test (Dependent Measures)[a]

	Low Praise Low Effort n = 29	Low Praise High Effort n = 27	High Praise Low Effort n = 28	High Praise High Effort n = 26
Attitude Toward Content of The Process of Education	2.39 .88	2.42 .59	2.68 .57	2.47 .58
Cognitive Attitude Toward Reading Book	2.19 .98	2.46 1.01	2.66 1.01	1.83 .66
Affective Attitude Toward Reading Book	2.79 1.24	2.87 1.12	3.30 .91	2.21 .90
Cognitive Attitude Toward Writing Book Assignment	2.62 1.23	2.70 1.09	2.79 .94	1.94 .74
Affective Attitude Toward Writing Book Assignment	3.50 1.38	3.59 1.23	3.64 .86	2.50 1.07

[a] 1 = favorable
5 = unfavorable

Table 1b

Tests of Significance of Praise by Effort MANCOVA for Attitudes Toward The Process of Education

Source of Variation	D.F.	F (Wilks Lambda criterion)	p less than	R
Praise	5,98	1.63	.159	.277
Effort	5,98	2.48	.037	.335
Praise x Effort	5,98	2.47	.038	.334

Univariate F tests

Variable	Source of Variation								
	Praise			Effort			Praise x Effort		
	F(1,102)	p	S.D.F.C.	F(1.102)	p	S.D.F.C.	F(1,102)	p	S.D.F.C.
Attitude Toward Content of Book	1.05	.30	-.655	1.24	.27	-.183	.944	.33	-.221
Cognitive Attitude Toward Reading Book	.16	.70	-.175	4.34	.04	-.419	10.73	.001	.458
Affective Attitude Toward Reading Book	.11	.75	-.274	6.76	.01	.622	9.30	.003	.300
Cognitive Attitude Toward Writing Book Assignment	.67	.42	-.148	10.86	.001	.927	7.40	.008	.180
Affective Attitude Toward Writing Book Assignment	3.63	.06	1.324	6.98	.01	-.002	8.96	.004	.300

Table 1c

Means and Standard Deviations of MANCOVA of Attitudes Toward the Chapter Post-Test (Dependent Measures)[a]

	Low Praise Low Effort n = 26	Low Praise High Effort n = 28	High Praise Low Effort n = 28	High Praise High Effort n = 28
Attitude toward the Content of the Chapter	2.45 .81	2.64 .39	2.69 .30	2.24 .96
Cognitive Attitude Toward Reading Chapter	2.12 .80	2.07 .49	2.29 .66	1.98 .76
Affective Attitude Toward Reading Chapter	2.65 1.07	2.77 .76	2.84 .77	2.41 1.02
Cognitive Attitude Toward Writing Chapter Assignment	2.92 1.21	2.82 1.08	2.41 .87	2.05 .89
Affective Attitude Toward Writing Chapter Assignment	3.30 1.27	3.34 .81	2.91 .90	2.57 1.19

[a] 1 = favorable
5 = unfavorable

Table 1d

Tests of Significance of Praise by Effort MANCOVA for Attitudes Toward the Chapter

Source of Variation	D.F.	F(Wilks Lambda criterion)	p less than	R
Praise	5,98	5.52	.001	.469
Effort	5,98	.23	.950	.107
Praise x Effort	5,98	1.16	.333	.237

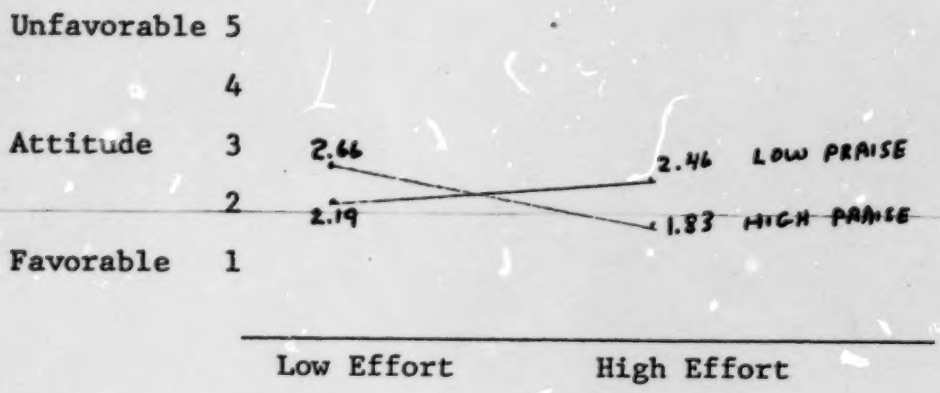
Univariate F tests

Variable	Source of Variation								
	Praise			Effort			Praise x Effort		
	F(1,102)	p	S.D.F.C.	F(1,102)	p	S.D.F.C.	F(1,102)	p	S.D.F.C.
Attitude Toward Content of Chapter	.23	.64	.030	.02	.90	-.230	5.20	.03	1.078
Cognitive Attitude Toward Reading Chapter	.02	.88	.914	.73	.40	1.447	.13	.72	-.280
Affective Attitude Toward Reading Chapter	.69	.41	1.370	.07	.79	-.332	.81	.37	.189
Cognitive Attitude Toward Writing Chapter Assignment	12.65	.001	-.795	.01	.93	-.656	.01	.97	-.164
Affective Attitude Toward Writing Chapter Assignment	10.65	.001	-.771	.08	.78	.103	.28	.59	-.137

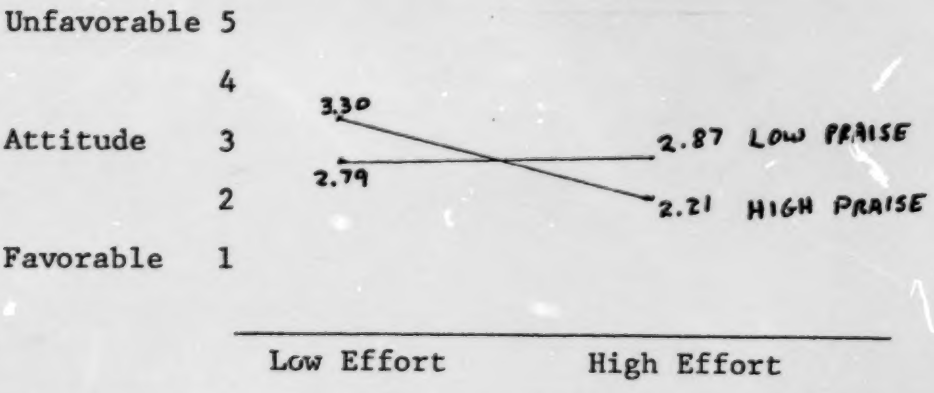
Graph 1

Means of Effort by Praise MANCOVA for Attitudes Toward Reading the Book and Writing the Book Assignment

Cognitive Attitude Toward Reading Book

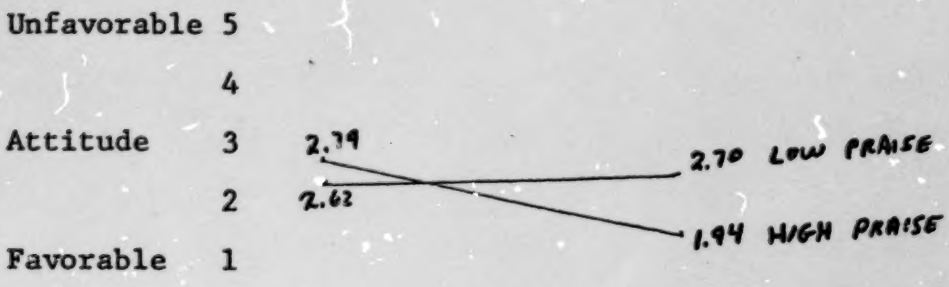


Affective Attitude Toward Reading Book



Graph 1 (continued)

Cognitive Attitude Toward Writing Book Assignment



Affective Attitude Toward Writing Book Assignment

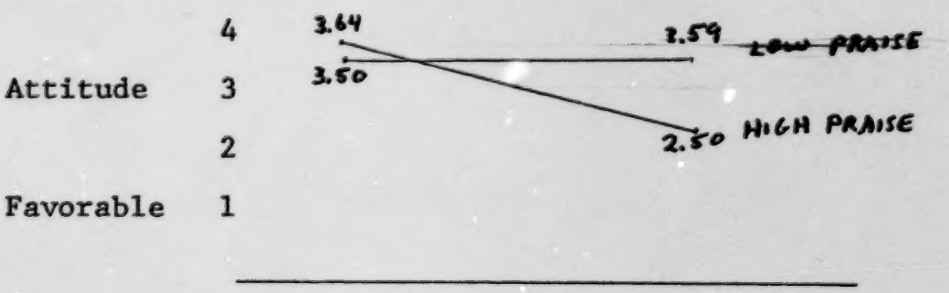


Table 2a

Means and Standard Deviations of Praise by Class ANOVA Dependent Variables for The Process of Education and the Chapter*

*(1=favorable, 5=unfavorable)

	Class 1		Class 2		Class 3		Class 4	
	No Praise	High Praise	No Praise	High Praise	No Praise	High Praise	No Praise	High
Attitude Toward Content of the Book	2.55 .35	2.54 .37	2.61 .34	2.82 .31	2.48 .19	2.59 .24	2.54 .79	2.5 .7
Cognitive Attitude Toward Reading the Book	2.73 1.02	1.96 .56	2.23 .70	2.77 .93	2.32 .68	1.82 .60	2.46 .97	2.5 1.1
Affective Attitude Toward Reading the Book	2.97 1.06	2.25 .64	3.12 1.16	3.23 .81	3.00 .89	2.36 .98	2.89 .86	3.3 .8
Cognitive Attitude Toward Writing Book Assignment	3.07 1.13	2.21 .70	3.04 .88	2.92 1.22	2.46 .57	1.77 .47	2.57 .72	2.7 .6
Affective Attitude Toward Writing Book Assignment	3.70 1.15	2.64 1.06	3.89 .82	3.58 .91	3.77 .88	2.55 .85	3.64 1.18	3.7 .8
	(n=15)	(n=14)	(n=13)	(n=13)	(n=11)	(n=11)	(n=14)	(n=1
Attitude Toward Content of the Chapter	2.60 .36	2.67 .25	2.63 .42	2.38 .74	2.72 .43	2.75 .37	2.64 .37	2.2 .9
Cognitive Attitude Toward Reading the Chapter	2.39 .66	2.20 .59	1.96 .31	2.00 .67	2.15 .24	2.42 .76	2.18 .61	2.1 .6
Affective Attitude Toward Reading the Chapter	2.82 .70	2.60 .74	3.00 .78	2.58 1.06	2.95 .86	3.17 .81	2.54 .69	2.4 .2
Cognitive Attitude Toward Writing Chapter Assignment	3.18 .80	2.50 .80	3.11 1.21	2.12 .89	3.15 1.05	2.25 .49	2.54 .89	2.2 .7
Affective Attitude Toward Writing Chapter Assignment	3.61 .88	2.77 .86	3.25 .70	2.85 1.25	3.50 .88	3.00 .95	3.43 .92	2.6 1.0
	(n=14)	(n=15)	(n=14)	(n=13)	(n=10)	(n=12)	(n=14)	(n=1

Table 2b

Tests of Significance of Praise by Class ANOVAs for The Process of Education and the Book

Variable	Source of Variation	df	F	p less than
Attitude Toward Content of the Book	Praise	1,98	.77	.33
	Class	3,98	.86	.47
	Praise x Class	3,98	.28	.84
Cognitive Attitude Toward Reading the Book	Praise	1,98	.88	.35
	Class	3,98	1.44	.24
	Praise x Class	3,98	3.28	.02
Affective Attitude Toward Reading the Book	Praise	1,98	.87	.35
	Class	3,98	2.60	.06
	Praise x Class	3,98	2.61	.06
Cognitive Attitude Toward Writing Book Assignment	Praise	1,98	4.90	.03
	Class	3,98	3.74	.01
	Praise x Class	3,98	1.69	.17
Affective Attitude Toward Writing Book Assignment	Praise	1,98	10.05	.002
	Class	3,98	2.55	.06
	Praise x Class	3,98	2.54	.06
Attitude Toward Content of the Chapter	Praise	1,98	1.68	.19
	Class	3,98	1.36	.25
	Praise x Class	3,98	1.03	.38
Cognitive Attitude Toward Reading the Chapter	Praise	1,98	.01	.93
	Class	3,98	1.67	.18
	Praise x Class	3,98	.67	.58
Affective Attitude Toward Reading the Chapter	Praise	1,98	.94	.34
	Class	3,98	1.47	.09
	Praise x Class	3,98	.43	.58
Cognitive Attitude Toward Writing Chapter Assignment	Praise	1,98	15.68	.001
	Class	3,98	1.25	.30
	Praise x Class	3,98	.68	.57
Affective Attitude Toward Writing Chapter Assignment	Praise	1,98	13.02	.001
	Class	3,98	.32	.81
	Praise x Class	3,98	.39	.76

three who received high praise developed more positive attitudes than students who received no praise, while in classes two and four it didn't make any difference whether the students received high or no praise. Classes one and three had the high effort assignment and classes two and four had the low effort assignment. The main effects for these three variables are uninterpretable by themselves because of the significant interaction.

Although the interaction for the cognitive attitude toward writing the book assignment was not significant the pattern of data is very similar to the three variables reported above. While the high praise students, overall, developed more positive attitudes, this finding is largely attributed to the differences in classes one and three. Similarly, the attitudes of classes one and three both high effort and no praise, are lower than those of classes two and four.

The class by praise interactions for the five dependent variables related to the chapter were not significant. The main effect of praise was significant for the variables: a) affective attitudes toward writing the assignment ($F(1,98) = 11.53$, $p < .001$), and b) cognitive attitudes toward writing the assignment ($F(1,98) = 13.45$, $p < .001$). In all four classes the high praise students reported a more favorable attitude toward writing the assignment than did the no praise students. Although not significant, classes two and four, which had the high effort assignments, showed high praise students with a more positive attitude than no praise students. Both high praise and no praise students of classes one and three reported the same attitudes. The main effect of class did not show any significant differences.

The results using each question as a dependent variable in the praise by effort analyses for the book showed no significant differences. Several of the items used to measure attitude toward the content of the chapter, while

not reaching a p level of .001 (which would safely reduce the chances of a type one error) did show a pattern similar to the results of the task related attitudes. Four questions had a significance level of at least .05 in the interaction between effort and praise, showing the high praise, high effort student with more positive attitudes.

The results of the analyses of potentially confounding variables associated to each class showed some differences, but none of these seemed to affect the measures of the dependent variables or the interpretation of the results. There was some variance reported in the number of males and females, and seniors, in each class, interest in teaching as a career, class organization, and instructor knowledge of the subject matter. However, the praise by class results show that differences between classes with the dependent variables is consistent, and if any of these factors affects the results the pattern would not be the same across classes.

Discussion

The results of the praise by effort multivariate analysis of covariance indicate similar patterns of significance for the book and chapter task related attitudes. The interaction between effort and praise means that the effect of praise depends on whether the student had the high or low effort assignment. Seemingly, students who exert high effort regard high praise feedback as more meaningful than no praise, whereas students who exert little effort do not seem to be affected differentially by high or no praise. The difference between the book and chapter results may be due to the amount of effort required for the assignments. The students indicated less effort was exerted in the chapter assignments than the book assignments, thus the effect of the

effort variable was not as strong in the chapter as the book.

It was hypothesized that the effect of praise toward the task would be viewed as an extrinsic reward, defining success or failure. If extrinsic, the results should have replicated Aronson's study (1961), showing no difference in the high effort condition for rewarded or unrewarded subjects, but a difference in the low effort condition. Evidently, the written comments were viewed by the students as intrinsic rewards for the task. This would explain why no dissonance effect was obtained in the high effort condition.

The disordinal interaction for the attitudues toward the book indicates that students in the low effort condition who received no praise developed more positive attitudes than students who received high praise. This is an unexpected and interesting result, repeated to a lesser degree with the attitudes toward the chapter. These results suggest that dissonance may have been experienced in the low effort condition. This would explain why students receiving no praise indicated that the task was both more enjoyable and valuable than students receiving high praise for their work. Perhaps students in the low effort condition perceived the reward of praise as more extrinsic than intrinsic?

The results of the class by praise analyses support the findings of the praise by effort MANCOVAs. The data showed that students in the high effort classes formed more favorable attitudes if they received high praise than students who received no praise. There was little difference between high and no praise students in the classes which received the low effort assignment. Furthermore, each class which had a high or low effort assignment showed the same pattern between high and no praise. This means that in pooling the classes in the praise by effort analyses each class contributed equally to the differences attained. In other words, one class was not responsible for

the results in the praise by effort MANCOVA.

The results of the study should be viewed with some caution because of the following two limitations. First, in a check of the experimental manipulations, the high and low effort groups did not report any difference in the amount of effort actually exerted. The high effort assignments were more comprehensive, longer, confirmed by other instructors as requiring more effort, and pre-tested. Also, the results clearly show that this condition had a differential impact on the attitudes formed. It is possible that the measure of effort was not sensitive enough or in some other way not accurate. Also, other factors associated with effort, such as meaningfulness, may have caused the difference. For instance, if the high effort assignment was also more meaningful, the perceived effort may be less than actually exerted, while a shorted but more mundane assignment would be perceived as requiring a greater amount of effort. Finally, attribution theory might explain the results. Since the students received the high or no praise feedback before completing the post-tests, the feedback could have affected the perception of effort. In the high effort group students who received no praise would rationalize their failure in lack of effort exerted. If true, this would lower the overall average of reported effort in the high effort group. The low effort group, on the other hand, would not be affected as much since less investment (effort) was involved. For these reasons, the manipulation of the effort condition is considered successful, though effort may not be the only contributing factor to the differences attained.

The second caution has to do with the unit of statistical analysis used in the data analyses. The lowest unit of randomization should also be the unit of analysis. In the present study this would mean that in the praise by effort MANCOVAs classrooms, not individuals, would be the

unit of analysis. This would provide two replications in each cell and statistical significance would be improbable. While the assignments are given by class, each individual reads the material, writes the assignments, and receives feedback separately from every other individual. Thus, the problem of not assuring independence between treatment replications is avoided by having the students complete the treatments individually outside of class. A second requirement for determining the statistical unit is the smallest division of random assignment. While students have no reason for choosing a particular section, other than it fits into their time schedule, there is not strict randomization by students to the effort treatment. However, the assignment of high or no praise is random by student. Thus, while there may be some question about using students as the unit of analysis in the praise by effort design, it is surely better to report the results with caution than not conduct the study because too few classes were available.

Conclusions

This study examined the impact of effort and praise on the attitude formation of students in a real-life classroom situation. The results suggest that the effect of praise in the form of written comments depends on whether the student exerted high or low effort in the task for which he/she was praised. Students who exerted high effort and received high praise feedback developed significantly better attitudes toward reading the material and writing the assignment than students who exerted high effort and received no praise, or those who exerted low effort, regardless of praise.

The generalization of these findings is limited to college students and the materials, assignments, and type of praise used. However, the students

represent all class levels except freshmen and wide range of majors. The same results were replicated with two different materials, and statistical significance was attained with a group of subjects which has a history of not showing significant differences in studies of attitude formation and development (McMillan, 1976). Another limitation is that the students reported their attitudes within fifteen minutes of receiving the feedback. It is possible that, after a day or two, they could change this attitude.

If confirmed with additional research, the results mean that intrinsic rewards will most effectively promote positive attitudes if the praise follows high effort exertion by the students. This study seems to indicate that when students do not exert much effort the intrinsic reward will not promote more favorable attitudes. These findings suggest that the impact of rewards on attitude formation may not be as simple as promulgated by Mager, Block, and others. Deci's research (Deci, 1971) on the effect of praise is relevant since it confirms that the nature of the reward, as intrinsic or extrinsic, may make a difference in the attitudes formed. Even Deci, however, did not account for different amounts of effort. The fact that school related assignments vary in the amount of effort required may account for the inconclusive evidence on the effect of using rewards to develop attitudes. The important conclusion from the results of the study, if substantiated in other settings, is that teachers can develop more positive attitudes if they require hard work and use intrinsic rewards.

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